We Claim:

1. A structure for providing light, comprising:

a substrate;

an amorphous oxide material overlying the substrate;

a monocrystalline perovskite oxide material overlying the amorphous oxide material;

a monocrystalline compound semiconductor material overlying the monocrystalline perovskite oxide material;

a photovoltaic device formed using the monocrystalline compound semiconductor material; and

a light-emitting semiconductor component formed using the monocrystalline compound semiconductor material and responsive to electrical energy produced by the photovoltaic device.

2. The structure of claim 1, further comprising:

a diffuser formed over the light-emitting semiconductor component.

3. The structure of claim 1, wherein the light-emitting semiconductor component is selected from the group consisting of a light emitting diode (LED) and a vertical cavity surface emitting laser (VCSEL).

4. The structure of claim 1, wherein the substrate includes:

a glass substrate; and

a monocrystalline silicon layer overlying the glass substrate.

5. The structure of claim 4, further comprising:

a thermal oxide layer between the glass substrate and the monocyrstalline silicon layer.

6. The structure of claim 4, wherein the monocrystalline silicon layer is formed on the glass substrate using a lateral solidification technique.

7. A liquid crystal display (LCD), comprising:

a first polarizer;

a liquid crystal (LC) panel placed behind the first polarizer;

a second polarizer behind the LC panel;

a bandpass reflector, placed behind the second polarizer, for permitting light to pass therethrough; and

a back-lighting panel placed behind the bandpass reflector comprising at least one photovoltaic device for producing electric energy in response to the light, and at least one light-emitting component responsive to the electric energy produced by the at least one photovoltaic device.

8. The LCD of claim 7, wherein the back-lighting panel further includes:

a substrate;

an amorphous oxide material overlying the substrate;

a monocrystalline perovskite oxide material overlying the amorphous oxide material; and

a monocrystalline compound semiconductor material overlying the monocrystalline perovskite oxide material;

wherein the at least one photovoltaic device and the at least one light-emitting semiconductor component are formed using the monocrystalline compound semiconductor material.

9. The LCD of claim 8, wherein the substrate includes:

a glass substrate; and

a monocrystalline silicon layer overlying the glass substrate.

10. The LCD of claim 9, further comprising:

a thermal oxide layer between the glass substrate and the monocyrstalline silicon layer.

11. The LCD of claim 9, wherein the monocrystalline silicon layer is formed on the glass substrate using a lateral solidification technique.

12. The LCD of claim 7, further comprising:

at least one diffuser formed over the at least one light-emitting component.

13. The LCD of claim 7, wherein the at least one light-emitting component is selected from the group consisting of a light emitting diode (LED) and a vertical cavity surface emitting laser (VCSEL).

14. The LCD of claim 7, wherein the bandpass reflector is a holographic reflector.

15. A process for fabricating a semiconductor structure, comprising:

providing a substrate;

depositing a monocrystalline perovskite oxide film overlying the substrate, the film having a thickness less than a thickness of the material that would result in strain-induced defects;

forming an amorphous oxide interface layer containing at least silicon and oxygen at an interface between the monocrystalline perovskite oxide film and the substrate;

epitaxially forming a monocrystalline compound semiconductor layer overlying the monocrystalline perovskite oxide film; and

forming a photovoltaic device using the monocrystalline compound semiconductor material;

forming a light-emitting semiconductor component using the monocrystalline compound semiconductor material.

16. The process of claim 15, further comprising:

forming a diffuser over the light-emitting semiconductor component.

17. The process of claim 15, wherein the light-emitting semiconductor component is selected from the group consisting of a light emitting diode (LED) and a vertical cavity surface emitting laser (VCSEL).

18. The process of claim 15, wherein the step of providing the substrate includes:

providing a glass substrate; and

forming a monocrystalline silicon layer overlying the glass substrate.

19. The process of claim 18, further comprising:

forming a thermal oxide layer between the glass substrate and the monocyrstalline silicon layer.

20. The process of claim 18, wherein the monocrystalline silicon layer is formed on the glass substrate using a lateral solidification technique.

21. A method for manufacturing a liquid crystal display (LCD), comprising:

providing a polarizer;

placing a liquid crystal (LC) panel behind the polarizer;

placing a bandpass reflector behind the LC panel, the bandpass reflector for permitting a predetermined amount of light to pass therethrough; and

placing a back-lighting panel behind the bandpass reflector, the back-lighting panel comprising at least one photovoltaic device for producing electric energy in response to the predetermined amount of light, and at least one light-emitting component responsive to the electric energy produced by the at least one photovoltaic device.

22. The method of claim 21, further comprising:

providing a substrate;

depositing a monocrystalline perovskite oxide film overlying the substrate, the film having a thickness less than a thickness of the material that would result in strain-induced defects;

forming an amorphous oxide interface layer containing at least silicon and oxygen at an interface between the monocrystalline perovskite oxide film and the substrate;

epitaxially forming a monocrystalline compound semiconductor layer overlying the monocrystalline perovskite oxide film; and

forming the at least one photovoltaic device using the monocrystalline compound semiconductor material; and

forming the at least one light-emitting component using the monocrystalline compound semiconductor material

23. The method of claim 21, further comprising:

forming at least one diffuser over the at least one light-emitting component.

24. The method of claim 23, wherein the diffuser is a phosphor material.

25. The method of claim 21, wherein the at least one light-emitting component is selected from the group consisting of a light emitting diode (LED) and a vertical cavity surface emitting laser (VCSEL).

26. The method of claim 21, wherein the bandpass reflector is a holographic reflector.

27. The method of claim 21, wherein the step of providing the substrate includes:
providing a glass substrate; and
forming a monocrystalline silicon layer overlying the glass substrate.

28. The method of claim 27, further comprising:
forming a thermal oxide layer between the glass substrate and the monocyrstalline silicon layer.

29. The method of claim 26, wherein the monocrystalline silicon layer is formed on the glass substrate using a lateral solidification technique.